

CLAIMS

What is claimed is:

1. A liquid crystal display apparatus, comprising:

a first substrate having pixel electrodes formed in regions surrounded by a plurality of scanning lines and signal lines;

a second substrate on which a transparent electrode is formed;

orientation controlling means that are formed at least on either the first substrate or the second substrate;

alignment films deposited on the said two substrates, to which vertical alignment treatment is applied; and

a liquid crystal layer having negative dielectric anisotropy, which is sandwiched between the two substrates, where liquid crystal molecules are vertically aligned when no electric field is applied to the said liquid crystal layer, and tilt to be aligned in directions controlled by the said orientation controlling means when electric field is applied to the said liquid crystal layer,

whereby the said orientation controlling means is positioned to be approximately symmetrical with respect to a line by using the said scanning line and the said signal line as a boundary such that the position of the orientation controlling means in relation to pixels adjacent to each other along the scanning line differs from its position in relation to pixels adjacent to each other along the signal line.

2. The liquid crystal display apparatus according to Claim 1, wherein the orientation controlling means comprises belt-shaped protrusions that are formed at least on either the first substrate or the second substrate, and slits corresponding to the said protrusions are formed on the other substrate in which no protrusions are formed.

3. The liquid crystal display apparatus according to Claim 2,

wherein the said slits are formed on the said pixel electrodes, the said belt-shaped protrusions being formed on the said second substrate, where a first polarizing plate is arranged outside the first substrate, and a second polarizing plate having a transparent axis which is orthogonal to the transparent axis of the first polarizing plate is arranged outside the second substrate.

4. The liquid crystal display apparatus according to Claim 2, wherein a sealing material that substantially adheres the entire periphery of the first substrate and the second substrate is provided except for a liquid crystal filling port, and the said protrusions of two adjacent pixels are formed to lie approximately linearly symmetrical by using either the said scanning line or the said signal line which is parallel to the side on which the said liquid crystal filling port has been provided as a boundary.

5. The liquid crystal display apparatus according to any one of Claims 1 to 4, wherein the directions controlled by the said slits and the said protrusions when electric field is applied to the said liquid crystal layer are any one of two directions or four directions.

6. A liquid crystal display apparatus, comprising:

a first substrate on which pixel electrodes are arranged in a matrix state;

a second substrate on which a transparent electrode is formed;

orientation controlling means that are formed either on the said first substrate or the said second substrate;

alignment films deposited on the said two substrates to which vertical alignment treatment is applied; and

a liquid crystal layer having negative dielectric anisotropy, which is sandwiched between the two substrates, where liquid crystal molecules are vertically aligned when no electric field is applied to the liquid crystal layer,

and tilt to be aligned in directions controlled by the said orientation controlling means when electric field is applied to the liquid crystal layer,

where the arrangement of the orientation controlling means in two types of pixels used as unit pixels is linearly symmetrical and approximately the same number of the two types of pixels are irregularly arrayed.

7. The liquid crystal display apparatus according to Claim 6, wherein the orientation controlling means comprise belt-shaped protrusions that are formed at least on either the first substrate or the second substrate, and slits corresponding to the said protrusions are formed on the other substrate in which no protrusions are formed.

8. The liquid crystal display apparatus according to Claim 7, wherein the slits are formed on the said pixel electrodes, the belt-shaped protrusions being formed on the second substrate corresponding to the said slits, the said first polarizing plate being arranged outside the first substrate, and the second polarizing plate having a transparent axis which is orthogonal to the transparent axis of the first polarizing plate is arranged outside the second substrate.

9. The liquid crystal display apparatus according to any one of Claims 7 or 8, wherein the protrusions in a unit pixel comprise one or more L-shaped protrusions and one or more linear protrusions lying parallel with the L-shaped protrusions, and the slits consist of one or more of L-shaped slits lying parallel with the L-shaped protrusions and one or more linear slits lying parallel with the said linear protrusions.

10. The liquid crystal display apparatus according to any one of Claims 7 or 8, wherein the protrusions and the slits in a unit pixel be linear in form lying parallel with each other, and are arranged so as to create an angle of approximately 45° in relation to the transparent axes of the first polarizing plate and the second polarizing plate.